

Paediatric Sedation: Experience in Hong Kong

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Recent developments in diagnostics have enabled an increasing number of investigative procedures to be performed on an out-patient basis. To ensure patient cooperation during such procedures, sedation and analgesia may be necessary. Appropriate administration of sedation, including the choice of medication and monitoring, is vital to ensure safety. This paper serves as a short editorial to accompany the detailed review by Pena and Krauss.¹ (see page 5)

A child is more likely to require sedation than an adult. Historically, pain and stress in children have been under-reported, undertreated and misunderstood. Contrary to popular belief, children often do remember traumatic experiences that can consequently affect future development and behaviour. If stresses are not alleviated, the mortality and morbidity can increase significantly.

Many factors, both internal and external, influence a child's response to stress or pain. Internal

factors include the child's age, developmental level and previous experience of painful or stressful events. External factors include the parental interaction with the child, preparation of the child for the procedure, and the environment in which the procedure is performed. These can contribute significantly towards the child's perception of pain and discomfort.

A team of medical staff with adequate training and experience is necessary. Thorough preparation of the patient, staff and equipment prior to performing the procedure is vital; every detail, however minor, must be considered and evaluated. Limiting sleep for patients under 4 years of age may be beneficial. EMLA cream, (lido-caine 2.5% with prilocaine 2.5%), applied under an occlusive dressing at least one hour in advance can reduce the pain of intravenous cannulation. For very painful procedures, sedation will not be effective without good analgesia.

With the increasing number of short investigations and therapeutic procedures being performed, it

is impossible to have an anaesthetist available on every occasion. Unlike an anaesthetist, most clinicians' knowledge of sedation and airway management is limited. To ensure that these procedures are performed safely, training and appropriate guidelines for the non-anaesthetist are essential. Each institution should have its own guidelines so that staff know what action to take and who to call for help if complications are encountered.

Pena and Krauss¹ provide a comprehensive review of commonly used medications. To ensure safety, a doctor should be familiar with the properties and side effects of all the drugs used in his/her institution; he does probably not need to know all the sedative agents available to medicine.

Sedation can take the form of conscious sedation, deep sedation and general anaesthesia. It is difficult to predict however, when a patient will lapse from one stage to another. Thus clinics that perform out-patient procedures under sedation should be prepared to manage

all levels of sedation and general anaesthesia, even if only conscious sedation is intended. For the non-anaesthetist, sedation of patients should be restricted to the conscious level; the patient should be readily rousable, and independently maintain airway patency and all protective reflexes. Deep sedation is a medically controlled state of depressed consciousness from which the patient is not easily rousable. It can be accompanied by partial or complete loss of protective reflexes and an inability to maintain airway patency.

Sedated patients should be closely monitored. Pulse oximetry provides a sensitive means of detecting complications; hypoxia is one of the most frequent. Hypoxia can be promptly corrected by the administration of oxygen, however the underlying problems such as alveolar collapse, or aspiration must also be managed.

In Hong Kong, there are no children's hospitals. Most children are cared for in paediatric units within a general hospital. All facilities have to be shared with adult patients; as such they are not

designed with children in mind. During short procedures, sedation is usually administered by the doctor performing the procedure or by a paediatrician escorting the patient. Junior doctors are often asked to administer sedation in the mistaken belief that, by being short, such procedures are "safe". A 1996 survey revealed that only six out of ten hospitals had formal written policies on sedation. Sedative agents varied significantly between hospitals.

The revised American Academy of Pediatrics guidelines² have encouraged doctors to standardise the practice of sedation. A committee consisting of paediatricians, radiologists and anaesthetists from various hospitals was set up in 1996 to formulate local guidelines, that were published 3 years later.³ The guidelines were intended to be as simple and practical as possible. (Table)

Although pentobarbitone is very popular in North America, it is unavailable in Hong Kong. However, members agreed that pentobarbitone is quite effective and should thus be included in the recommendation. It is likely to be available shortly in Hong Kong.

Paraldehyde, considered an "old-fashioned" drug, has fallen out of favour in the US because of its nasty smell and prolonged effect. However, it is included in the local guidelines as it is useful in the absence of pentobarbitone.

Table. Sedation in Children

First line

Neonate	Chloral hydrate 50 mg/kg oral
Children below 5 years	Chloral hydrate 75 mg/kg oral 30 minutes before the procedure. A top-up dose of 25 mg/kg may be given for unsuccessful cases
Children above 5 years	Midazolam 0.2 mg/kg IV with additional dose of 0.1 mg/kg at 2 to 3 minute interval up to a maximum of 0.5 mg/kg or Pentobarbitone 2 mg/kg IV with further dose to a maximum of 5 mg/kg

Second line

Children below 5 years	Midazolam 0.1 to 0.2 mg/kg IV, repeat dose of 0.1 mg/kg at 2 to 3 minute intervals to a maximum of 0.5 mg/kg or Pentobarbitone 2 mg/kg IV with further dose up to maximum of 5 mg/kg
Children above 5 years	Rectal paraldehyde 0.3 mL/kg

Third line

	Ketamine 1 mg/kg IV with additional dose of 1 mg/kg Atropine 0.01 to 0.02 mg/kg IV to reduce salivation
Painful Procedures	Midazolam 0.1 to 0.2 mg/kg IV with local anaesthetic and/or pethidine 0.5 to 1 mg/kg IV or Ketamine 1 to 2 mg/kg IV or 2 to 4 mg/kg IM with atropine

Rectal administration is recommended, as deep intramuscular injection is very painful and can result in development of a sterile abscess. The drug is cheap and is still used in some Southeast Asian countries.

Ketamine is also very popular, especially for painful procedures. It provides excellent analgesia without causing severe respiratory depression or compromising airway patency. Given with atropine to block the muscarinic side effects, and a small dose of midazolam it enables safe, smooth and easily controllable sedation for painful procedures such as bone marrow aspiration.

Good sedation practice is vital in children. Successful sedation

requires not only a good understanding of the drugs used, but a thorough understanding of the whole process of sedation. For difficult cases, an anaesthetist who can readily provide general anaesthesia with more potent intravenous or inhalational agents should be responsible for the sedation.

REFERENCES

1. Peña BM, Krauss B. Pediatric sedation: seeing patients safely through. *Contemporary Pediatrics* 2000;17(8):42-52.
2. Practice guidelines for sedation and analgesia by non-anesthesiologist. Report by the American Society of Anesthesiologist Task Force on Sedation and Analgesia by non-Anesthesiologist. *Anesthesiology* 1996;84(2):459-471.
3. Guideline for sedation of children in diagnostic and therapeutic procedure. Coordinating Committees in Paediatrics and Diagnostic Radiology. Hospital Authority, Hong Kong, 1999.

FURTHER READING

1. Guideline for safety in sedation for diagnostic and minor surgical procedures. The Hong Kong College of Anesthesiologist Handbook. October 1992.
2. American Academy of Pediatrics, Committee on Drugs: Guideline for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. *Pediatrics* June 1992;89(6):1110-1115.
3. Menon-G, Anand KJ, McIntosh N. Practical approach to analgesia and sedation in the neonatal intensive care unit. *Semin Perinatol* 1998;22(5):417-424.

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